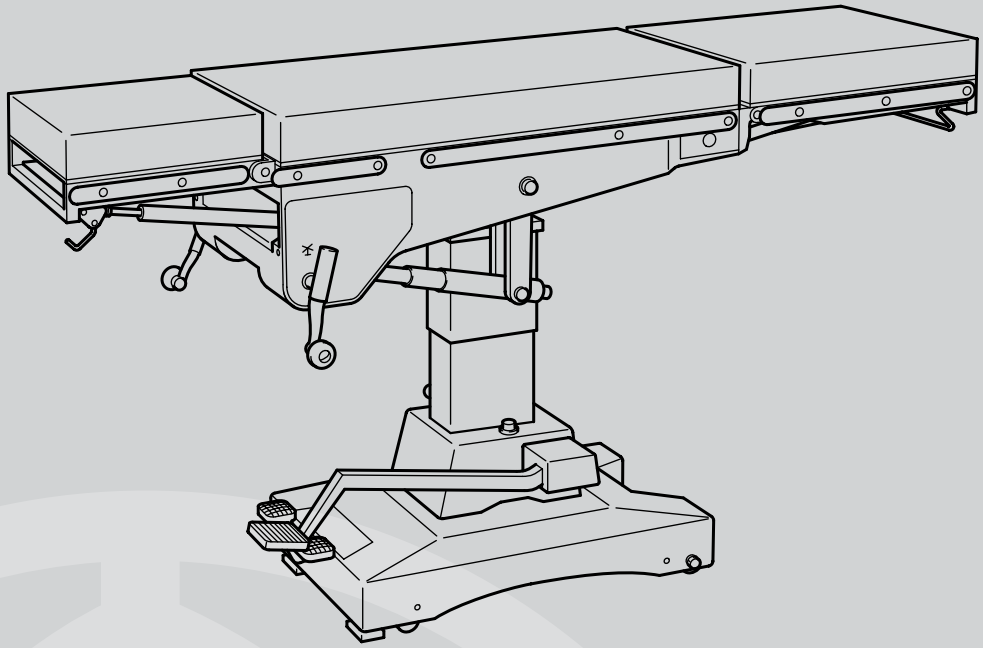
ESCHMANN

J1, J2, J3 & J5

OPERATION TABLES



Service Manual

699300

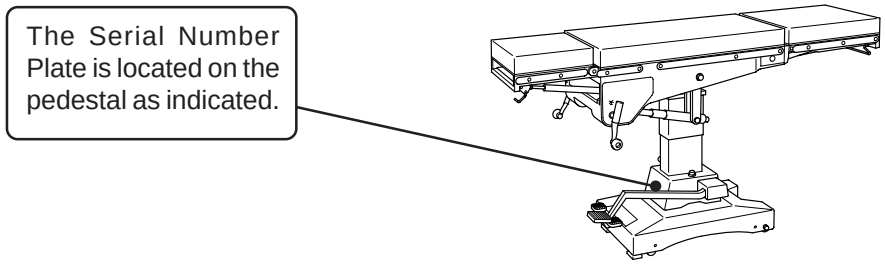
T-SM9e

Read these Instructions before use

Keep these 'Instructions' in a safe convenient place for future reference. Read in conjunction with the Publications detailed in Section 1.3..

Eschmann After Sales Service Department

The Eschmann After Sales Service Department is staffed and equipped to provide advice and assistance during normal office hours. To avoid delays when making enquires, please quote the Model and Serial Number of your Operation Table which is shown on the Serial Number plate, the location of which is shown below. Please ensure you include all alpha and numeric digits of the Serial Number.



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Overseas Customers

Contact your local distributor. In case of doubt contact Eschmann Equipment.

Trade marks

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CE If the CE mark is affixed to the product, it indicates compliance with Council Directive 93/42/EEC of 14 June 1993 concerning medical devices.

T-SM9e March 2002

CE

READ THESE INSTRUCTIONS BEFORE USE
Keep these Instructions in a safe convenient place for future reference. Read in conjunction with the relevant Publications detailed in the preliminary information section.

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1. PRELIMINARY INFORMATION

1.1 This Service Manual should be referred to for details of the J1, J2, J3 and the J5 general purpose, three or four-section, mobile, operation tables, REF 80-820-14, 80-800-11, 80-810-26, 80-810-41, 80-830-10 (serial numbers JIAA8E0000, J2AA8E0000, J3AB8E0000, J3RB8E0000, J4AB8E0000 respectively, or above).

1.2 Operation tables J1, J2 and J5 are similar. The J3 operation table is specially designed to meet the needs of gynaecological procedures, in addition to its suitability as a general purpose table. The differences between the J1, J2 and J5 tables, and the J3 table, are detailed in Part 7 of the Instructions for Use.

1.3 Instruction and Service Manuals should be readily accessible for reference prior to and when operating, cleaning and servicing the Operation Table. All manuals are available from Eschmann Equipment, see inside front cover for address details.

Related Technical Publications:-

Instructions for Use - J1 J2 J3 and J5 Operation Tables - T-IM22
Illustrated Parts List - J1 J2 J3 and J5 Operation Tables - T-IPL8

1.4 J3 and J5 tables comply with BS6859 Part 1: 1987 (except for clause 7).

2. TECHNICAL DATA

JI OPERATION TABLE

DIMENSIONS

Width including sidebars	545mm
Overall length	1905mm
Minimum table height without mattress	730mm
Maximum table height without mattress	1073mm

SIDE-BAR DIMENSIONS

UK	32 x 6.5mm
North America	28.5 x 9.5mm
Europe	25 x 9mm

MOVEMENTS

Maximum Trendelenburg	45°
Maximum Reverse Trendelenburg ..	30°
Head section adjustment ..	+40° -40°
Leg section adjustment ..	..+10° -100°
Table top rotation	360°

NET WEIGHT (approx) 196kg

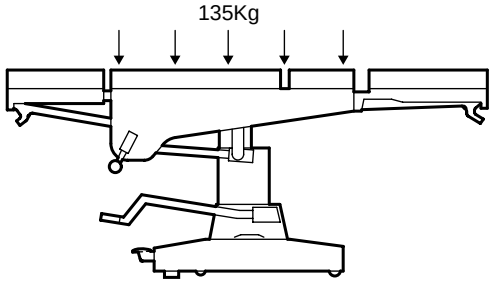
X-RAY ATTENUATION

The X-ray attenuation of the top of this operation table is equivalent to less than 0.5mm of 99.5% pure aluminium.

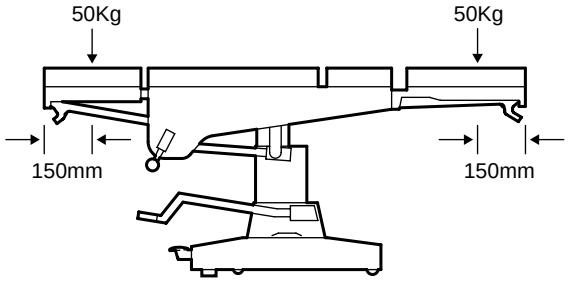
OIL CAPACITY .. .. .. 2.8 litres

TABLE LOADING

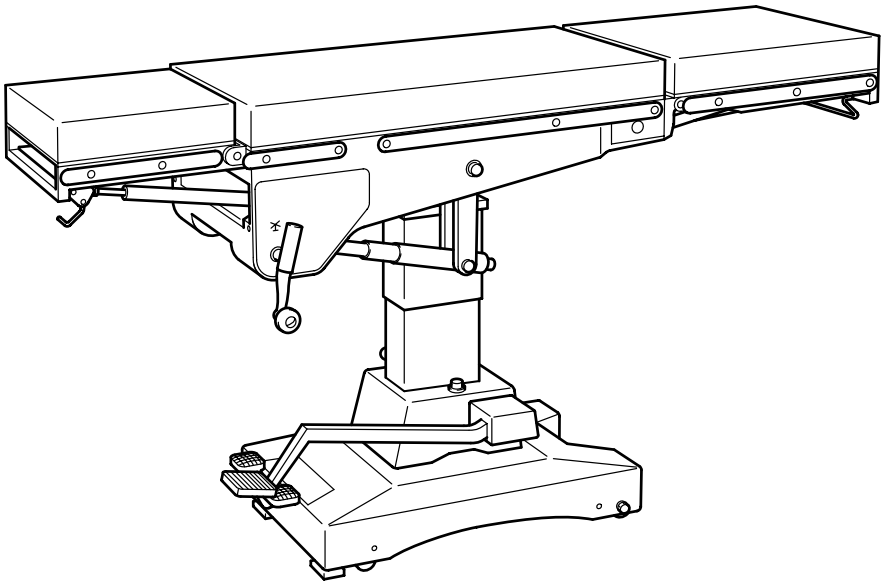
Retention of Adjusted Height: The table will retain its adjusted height with a load of 135kg uniformly applied to the trunk sections.



Longitudinal Deflection Load: The table will withstand a load of 50kg applied at a point 150mm in from either end of the head or leg section.



Also see the WARNINGS in Section 3, Safety Notes (page 9) for stability information and maximum loads for accessories.



2. TECHNICAL DATA

J2 OPERATION TABLE

DIMENSIONS

Width including sidebars	545mm
Overall length	1905mm
Minimum table height without mattress	730mm
Maximum table height without mattress	1073mm

SIDE-BAR DIMENSIONS

UK	32 x 6.5mm
North America	28.5 x 9.5mm
Europe	25 x 9mm

MOVEMENTS

Maximum Trendelenburg	45°
Maximum Reverse Trendelenburg ..	30°
Maximum Lateral Tilt	+15° -15°
Head section adjustment ..	+40° -40°
Leg section adjustment ..	..+10° -100°
Table top rotation	360°

NET WEIGHT (approx) 196kg

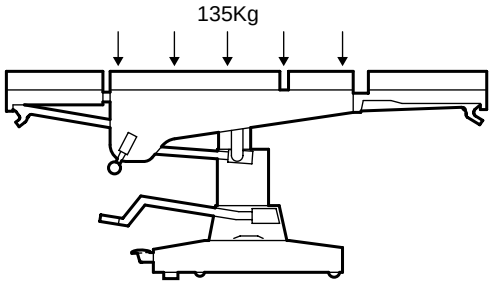
X-RAY ATTENUATION

The X-ray attenuation of the top of this operation table is equivalent to less than 0.5mm of 99.5% pure aluminium.

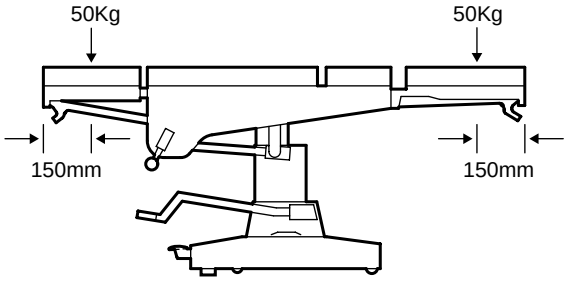
OIL CAPACITY .. .. .. 2.8 litres

TABLE LOADING

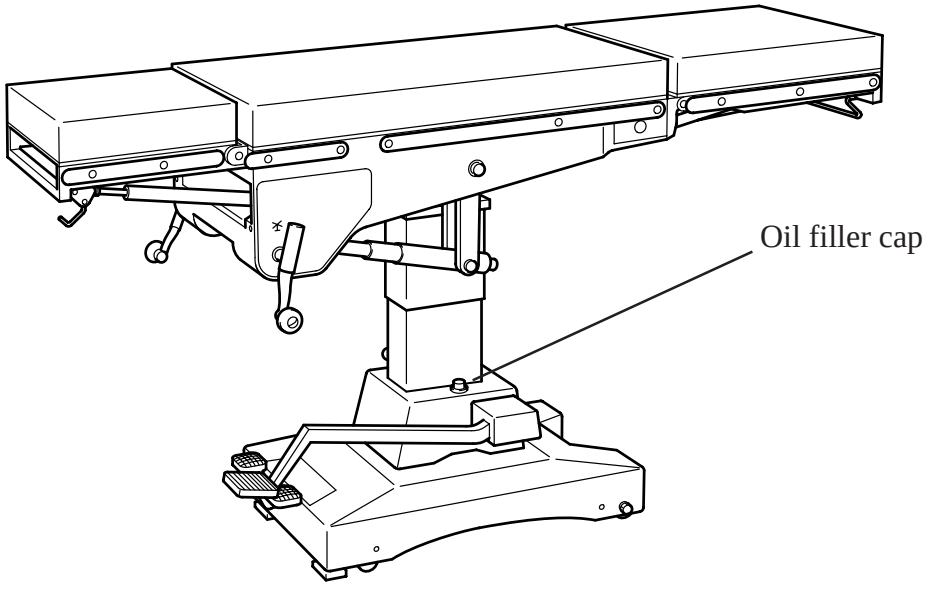
Retention of Adjusted Height: The table will retain its adjusted height with a load of 135kg uniformly applied to the trunk sections.



Longitudinal Deflection Load: The table will withstand a load of 50kg applied at a point 150mm in from either end of the head or leg section.



Also see the WARNINGS in Section 3, Safety Notes (page 9) for stability information and maximum loads for accessories.



2. TECHNICAL DATA

J3 OPERATION TABLE

DIMENSIONS

Width including sidebars 545mm
Overall length 1905mm
Minimum table height
without mattress 730mm
Maximum table height
without mattress 1073mm

SIDE-BAR DIMENSIONS

UK .. .. 32 x 6.5mm
North America .. .. .. 28.5 x 9.5mm
Europe .. .. 25 x 9mm

MOVEMENTS

Maximum Trendelenburg .. .. 45°
Maximum Reverse Trendelenburg .. 45°
Maximum Lateral Tilt .. .. .. +15° -15°
Head section adjustment +/- 40°(-10° traversed)
Leg section adjustment .. .. ..+10° -100°
Table top rotation .. .. .. 360°
Table top lithotomy traverse
Head and trunk sections traverse over perineal section

NET WEIGHT (approx) 196kg

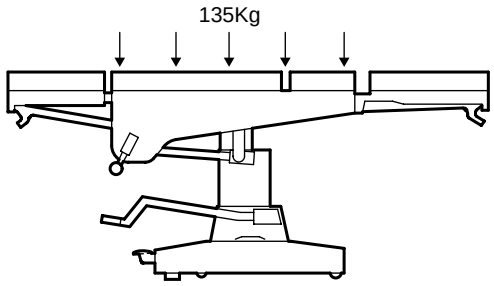
X-RAY ATTENUATION

The X-ray attenuation of the top of this operation table is equivalent to less than 0.5mm of 99.5% pure aluminium.

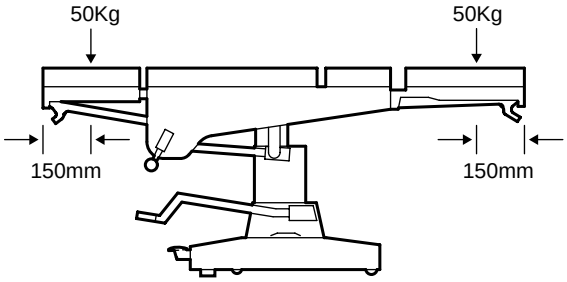
OIL CAPACITY .. .. .. 2.8 litres

TABLE LOADING

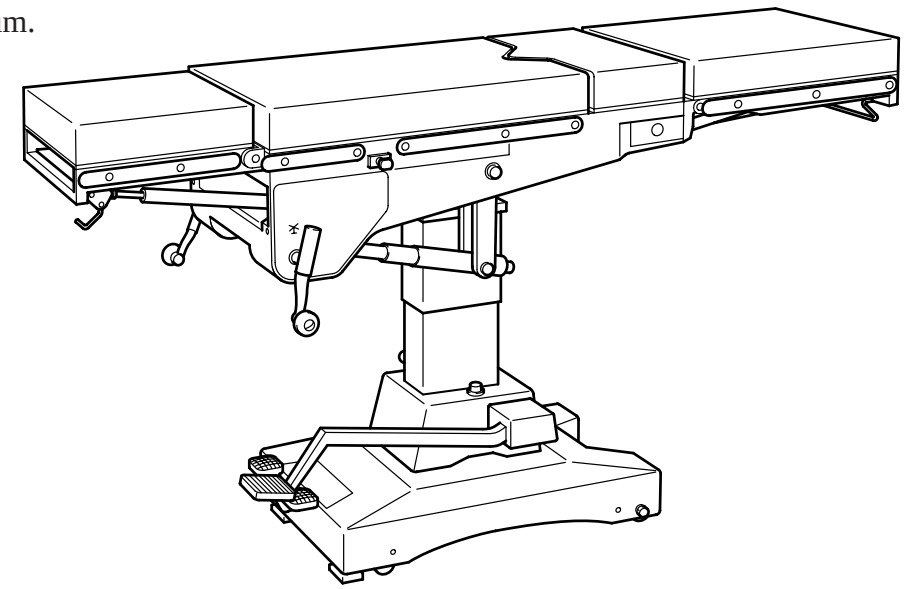
Retention of Adjusted Height: The table will retain its adjusted height with a load of 135kg uniformly applied to the trunk sections.



Longitudinal Deflection Load: The table will withstand a load of 50kg applied at a point 150mm in from either end of the head or leg section.



Also see the WARNINGS in Section 3, Safety Notes (page 9) for stability information and maximum loads for accessories.



2. TECHNICAL DATA

J5 OPERATION TABLE

DIMENSIONS

Width including sidebars	545mm
Overall length	1905mm
Minimum table height without mattress	680mm
Maximum table height without mattress	1020mm

SIDE-BAR DIMENSIONS

UK	32 x 6.5mm
North America	28.5 x 9.5mm
Europe	25 x 9mm

MOVEMENTS

Maximum Trendelenburg	45°
Maximum Reverse Trendelenburg	30° (10° with table lowered)
Head section adjustment	+40° -40°
Leg section adjustment	+10° -75°
Table top rotation	360°

NET WEIGHT (approx) 196kg

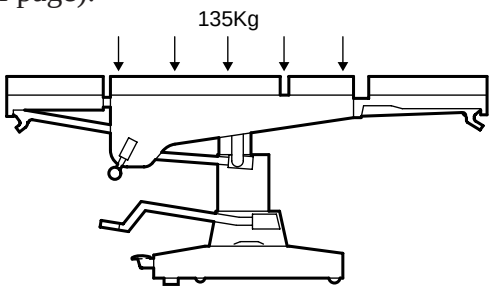
X-RAY ATTENUATION

The X-ray attenuation of the top of this operation table is equivalent to less than 0.5mm of 99.5% pure aluminium.

OIL CAPACITY .. .. .. 2.8 litres

TABLE LOADING

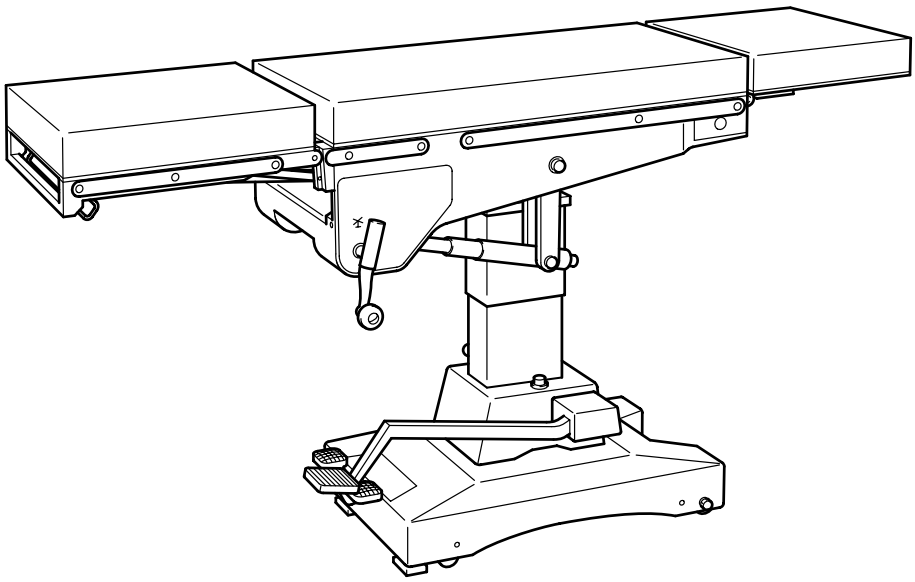
Retention of Adjusted Height: The table will retain its adjusted height with a load of 135kg uniformly applied to the trunk sections. (Note. Graphic is indicative only, for J5 sections see main graphic at foot of page).



Longitudinal Deflection Load: The table will withstand a load of 50kg applied at a point 150mm in from either end of the head section.

The maximum load for the leg section is 30kg.

Also see the WARNINGS in Section 3, Safety Notes (page 9) for stability information and maximum loads for accessories.



3. SAFETY NOTES

Attention to the following points will prolong the life and efficiency of your operating table and will help to avoid the risk of accidents, or damage:

DO:

- Keep the instruction manual close-to-hand.
- Read the instructions carefully before using the table.
- Check that the leg section is secure, and put the table base in the brake position before use.
- Lower the table top fully before washing the table.
- Read and follow the instructions for cleaning, and for the care of the mattresses and pads.
- Use the correct mattress and accessories.
- Service the table and accessories regularly.
- Remove table accessories and their clamps, in particular rotary clamps from side bars, when they are not in use.

DO NOT:

- Lift the table by its top.
- Push the table over rough surfaces, use a trolley.
- Drop the table (or individual sections) when transporting it.
- Put heavy weights on the table sections.
- Put sharp objects on, or against mattresses, pads, or the radiographic table top.
- Drop heavy objects onto the radiographic top.
- Spill oil, ether, or other chemical fluids onto the mattress or the pads.
- Pull the table by the head or leg section, always push it.
- Exceed maximum table loading

WARNINGS

The J Series of Operation Table have been designed to minimise the possibility of accidental electrosurgery burns. Contact with any metal surfaces (e.g. table side bars, or other equipment etc.) can cause burns during electrosurgery and must be avoided.

The J Series of Operation Table have been designed for patients weighing up to 135kg with their centre of gravity (normally the perineum) over the base. However patient positioning and additional loads can compromise table stability. Ensure that loading does not compromise table stability.

With the table in (or during transition into) the castor position, the centre of gravity of the patient (normally the perineum) should lie over the centre of the column. Whenever this is not practical the overhanging weight of the patient and table should be adequately supported (e.g. by at least two able people). Take extreme care when moving a table with a patient on and ensure that the table is at minimum height

The patient's weight should be supported whenever the sections are adjusted or removed from the table during re-positioning.

The head and leg sections are designed to support and position the appropriate part of the patient's weight only. Damage leading to failure of the section may be caused if excessive weight is applied.

The maximum loading weight of 10kg must not be exceeded for the Detachable ophthalmic head flap and the Non-Detachable head flap accessories, as this may cause damage to the accessory and could result in injury to the patient.

It is necessary to check at regular intervals for wear, corrosion, material fatigue and ageing on all accessories which support all or part of the body of the patient using a single gas-spring. Such accessories are the detachable ophthalmic head flap and the divided leg section.

4. MAINTENANCE

GENERAL

4.1 The information provided in this Service Manual falls into four categories:

- Cleaning, Disinfection, Care and Storage.
- Periodic lubrication, checks and adjustments
- Fault diagnosis and remedies
- Removal and installation of components

CLEANING, DISINFECTION, CARE AND STORAGE

4.2 For Cleaning, Disinfection, Care and Storage instructions refer to Section 8 of the Instructions for Use (Publication T-IM22, also see section 1.3).

PERIODIC LUBRICATION, CHECKS AND ADJUSTMENTS

Base Components (Fig. 2)

4.3 In order to carry out maintenance procedures to the table base, it is necessary to tilt the table on its side and expose the underside of the base. Proceed as follows:

i Remove the leg section in the normal manner. For J3 table remove also the perineal section and traverse the table top (see Instruction Manual, Publication No. T-IM22).

ii Raise the table top to its maximum height.

iii Place an anaesthetist's stool, or similar strong support, alongside the table.

iv Place the brake pedal in the 'castor' position.

v Stand on the same side of the table as the support but with the pump lever on the opposite side. Push the table away about 30 cm and then pull it back. This ensures that all the castors are pointing away from the operator. Two people on the same side of the table as the support (one at each end) can now each place a foot against the base and lever the table over gently, lowering it onto the support.

Castors and wheels (Fig. 2)

4.4. Clean each castor and wheel free of debris, then lubricate the castor and wheel ball races with a light machine oil (or WD40 aerosol lubricant).

Brakes and brake mechanism (Fig. 2)

4.5. Check the action of the brake mechanism and also check for wear on the brake pads, broken brake pinion or quadrant teeth and play in the quadrant taper pins. Check stop screws for wear. To replace quadrant see section 4.39; to replace quadrant pinion, see section 4.40.

4.6 Fit new brake pads where necessary, referring to section 4.38.

Hydraulic Cylinder (Fig. 1)

4.7 Raise the table top to its maximum height, then depress the height adjustment (hydraulic pump) pedal fully and check for smoothness and rate of descent.

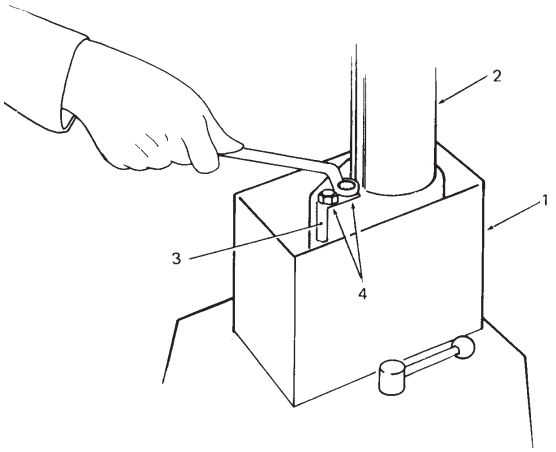


Fig. 1 Ram key adjustment

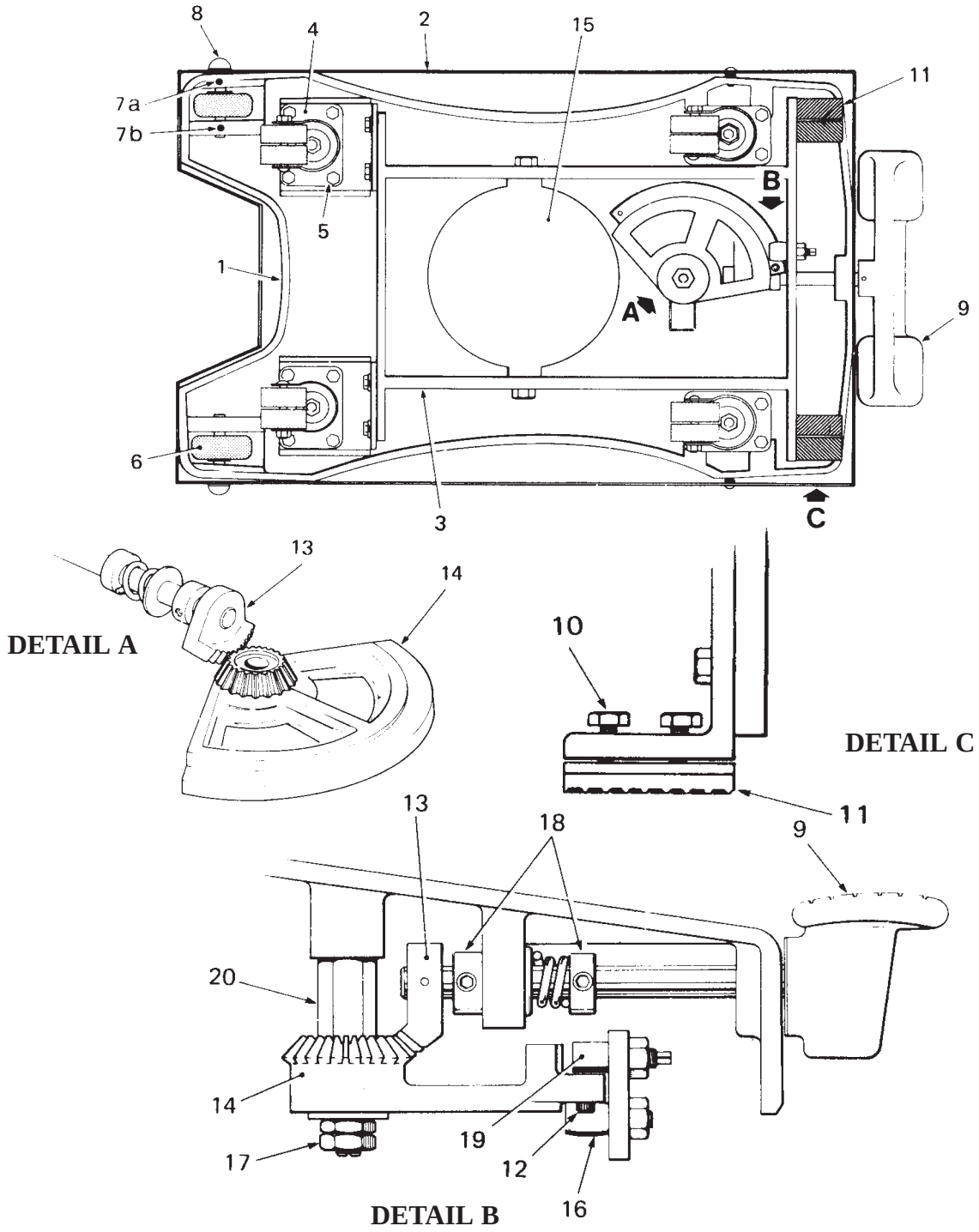
4.8 Raise the table top to its maximum height again and release the ram cover securing screws at the top. Lower the 3-section telescopic cover (1) to expose the ram (2) and ram key (3).

4.9 Remove the ram key, clean out keyway and refit key.

4.10 Examine ram surface for rust and, if present, clean off with fine emery cloth. Lubricate exposed surface of ram. Seal the top of the cylinder with cloth wound round the ram to prevent damage if using emery cloth.

4.11 Before refitting ram cover, check that table will raise and lower smoothly. If this is not the case, the ram key is probably secured too tightly. Release the key attachment bolts (4) slightly to remove excessive friction, then retighten.

4. MAINTENANCE



1.	Base casting	8.	Wheel spindle	15.	Oil sump
2.	Base cover	9.	Base control pedal	16.	Roller
3.	Castor frame	10.	Brake pad screws	17.	Quadrant securing nuts
4.	Castor	11.	Brake pad	18.	Brake shaft collars
5.	Castor mounting screw	12.	Stop screw	19.	Eccentric pin
6.	Wheel	13.	Pinion	20.	Quadrant pillar
7a/b.	Grub screws	14.	Quadrant		

Fig. 2 Base assembly

4. MAINTENANCE

4.12 Check for signs of oil leaks. If table will not pump to its full height, refill reservoir with the Eschmann oil supplied with the table, in small measures, lowering the table after each addition. This will avoid the risk of introducing too much oil into the hydraulic system.

Gears (Fig. 3)

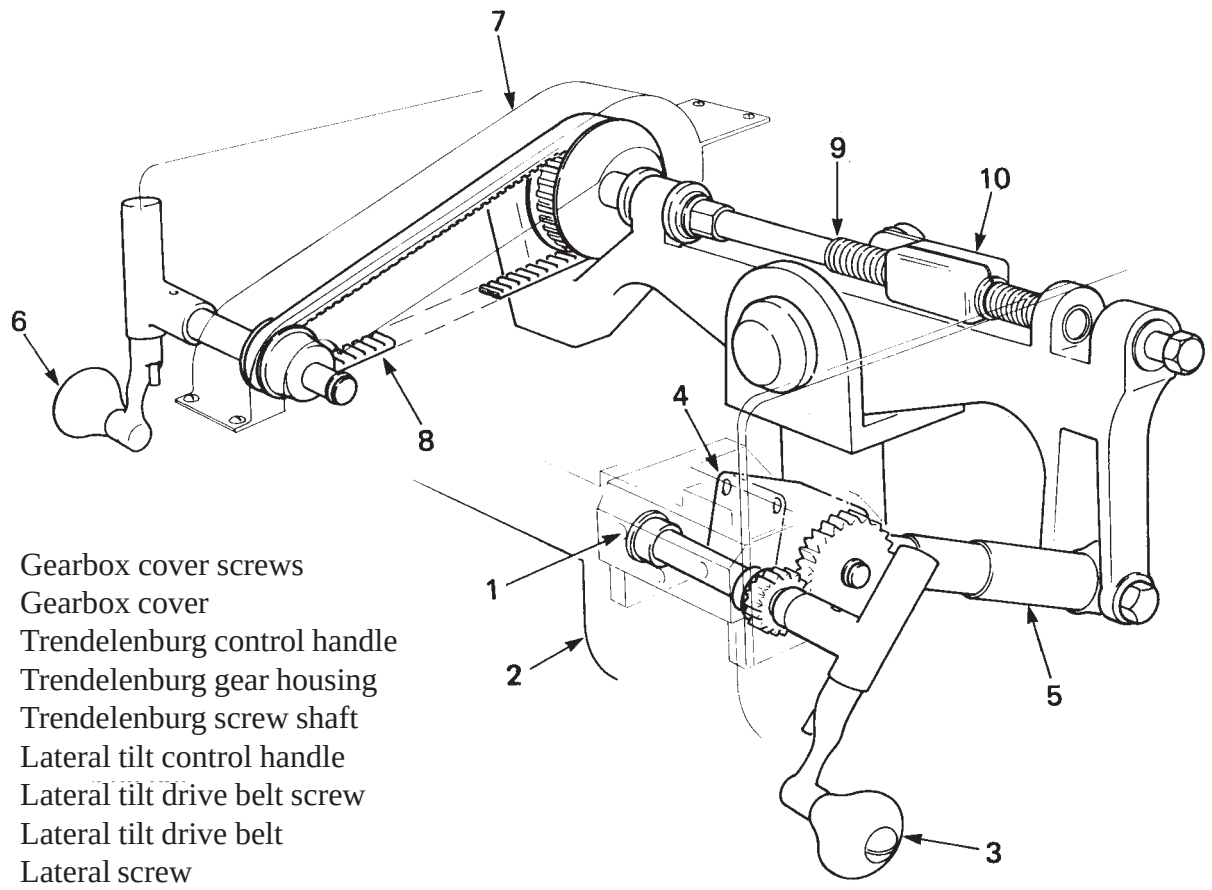
4.13 Remove socket head screws (1) and lift away gearbox cover (2). Proceed to examine gear operation as follows:

Trendelenburg (J1, J2, J3 and J5 tables)

4.14 Check operation of the Trendelenburg control handle (3) and ensure that full table top movement is achieved in both directions, with the table top raised from its lowest position (see Technical Data). Check also that the two grub screws (4) Fig. 7, securing screwed bush to bush housing are sufficiently tight and that the friction collar adjustment on the Trendelenburg screw shaft is satisfactory. Check tightness of pivot bolt (2) Fig. 6. If friction collar needs adjustment, refer to section 4.18.

Lateral Tilt (J2 and J3 tables only)

4.15 Check operation of the lateral tilt control handle (6) and ensure that full table top movement is achieved in both directions (see Technical Data). The lateral screw is driven by a toothed rubber drive belt (8). The condition and tightness of the drive belt should be examined periodically. If the drive belt is damaged or has become stretched (lack of positive movement when operating control handle) the belt will need to be replaced (refer to section 4.30). An examination to check



1. Gearbox cover screws
2. Gearbox cover
3 Trendelenburg control handle
4 Trendelenburg gear housing
5. Trendelenburg screw shaft
6. Lateral tilt control handle
7. Lateral tilt drive belt screw
8. Lateral tilt drive belt
9. Lateral screw
10. Lateral screw nut

Fig. 3 Gearbox of J2 and J3 operation tables (J1 and J5 table similar, without lateral tilt)

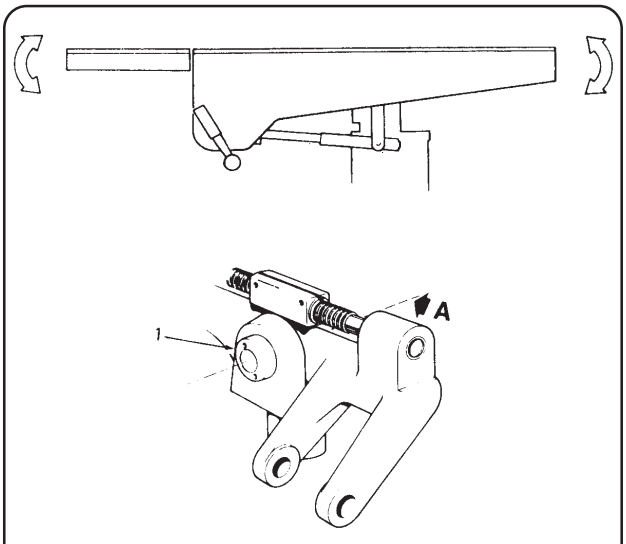
4. MAINTENANCE

for play in the table top will indicate whether or not there is any need to adjust tightness of the hinge pin and nut (see section 4.16) or the lateral screw and nut (see section 4.17).

Hinge pin and nut (Fig. 4)

4.16 Pull table top as shown in Fig. 4 to check for excessive play in the direction of the arrows. If there is excessive play present, check to see if hinge nut (1) and bolt (2) are loose. If so, * tighten hinge nut (1) against hinge bolt (2) sufficiently to take up the slackness. To do this, Eschmann recommend using two short lengths of 3/16 in. diameter round bar (3) inserted in the nut sockets, as illustrated in Fig. 4 and applying an improvised tommy bar (4) to turn the nut.

***Note:** This could also indicate play in Trendelenburg gear. If this is the case the complete Trendelenburg screw assembly must be replaced. For removal procedure, see section 4.18.



Sectional view in direction 'A'

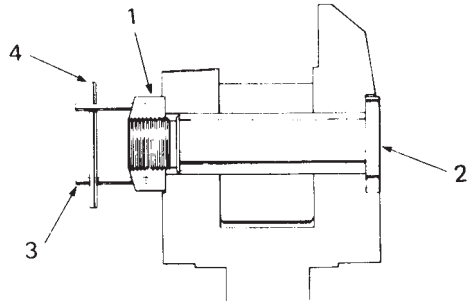


Fig. 4 Hinge pin and nut adjustment

Lateral screw and nut (Fig. 5)

4.17 Place table top in reverse Trendelenburg position, then select Lateral Tilt and operate control handle to test movement is satisfactory. Pull as shown in Fig. 5. If undue play is suspected proceed as follows:

i Check secureness of link pivot set screws (6) and (7).

ii Check secureness of grub screw on yoke (5) which locks lateral screw bearing.

CAUTION: Do not over-tighten.

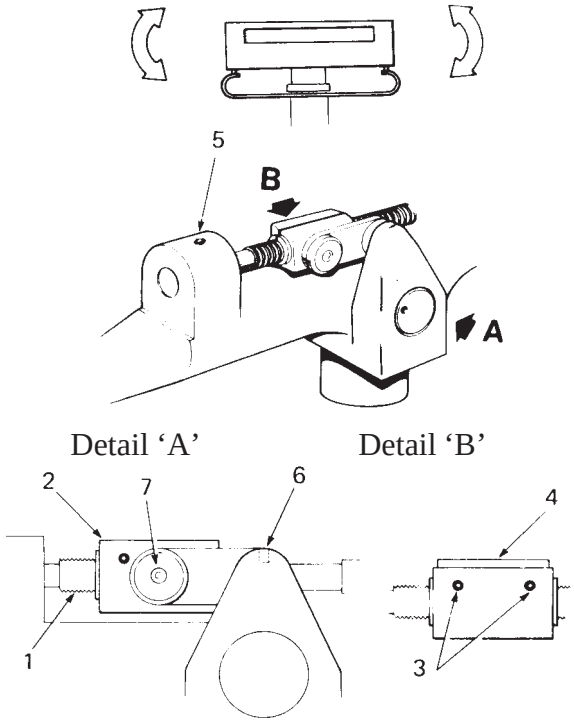


Fig 5 Lateral screw and nut adjustment

iii Finger testing at the point where the lateral screw (1) passes through the nut (2) will establish the need for the nut adjustment. First try tightening socket head screws (3) on nut. If excessive play is still present, shim removal will be necessary. Proceed as follows:

(a) Unfasten socket head screws (3) on nut and extract shim pack (4).

(b) Remove shims (0.002 in thickness per shim, approx.) one at a time until play is *just* taken up on re-tightening.

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Trendelenburg screw assembly friction collars (Fig. 6 and 7)

NOTE: Sections 4.18 and 4.19 should only be referred to for tables with serial numbers preceding those detailed below, for later tables or tables that have had the latest Trendelenburg screws fitted refer to section 4.20.

Tables with serial numbers as detailed (or above) have the latest Trendelenburg screw fitted:-

J1 - 2198 J2 - 1314
J3 - 0440 J5 - 3080

4.18 Check adjustment of friction collars on Trendelenburg screw. If the table does not easily stay in Trendelenburg or reverse Trendelenburg position, but tends to slip down under patient's weight, this indicates that the Tufnol friction collars (9) Fig. 7 need tightening. Proceed as follows:

i Remove the leg section as described in the Instruction Manual and then pump the table top to maximum height with the height adjustment pedal.

ii Elevate the head section to the maximum raised angle and place the table in maximum reverse Trendelenburg position.

iii Remove the gearbox cover (3) Fig. 6

iv Bolster the table top in position as shown in Fig. 6 and then free the lower end of the Trendelenburg screw assembly (1) Fig. 6 by removing the pivot screws (2) Fig. 6.

v Pivot the Trendelenburg screw assembly about its bevel gear housing (4) Fig. 6 to gain access, in turn, to the four screws (5) Fig. 6 holding the two halves of the housing together. Remove the four screws to separate the two half housings and remove the Trendelenburg screw assembly, with the bevel gear lower half housing from the table.

vi Refer to Fig. 7. Mark the bevel gear lower half housing (3) and screwed bush (12) to aid reassembly, then remove socket head grub screws (4) from the half housing and unscrew the screwed bush (12) until heads of friction collar grub screws (11) are exposed.

vii Tighten grub screws (11), securing friction collars (9), to a torque of 16 to 17 lbf in.

viii Screw screwed bush (12) into the half housing and secure with socket head grub screws (4).

ix Using a suitable torque wrench, attached to nut (17), check final friction of screw shaft (15); the torque required to turn screw shaft (15) should be between 30 and 35 lbf in. If final friction torque cannot be achieved, further tighten each friction collar grub screw (11), by 1 to 2 lbf in. per occasion until 30 to 35 lbf in. torque is achieved. If torque figure is not achieved by a maximum setting of 20 lbf in. then refer to section 4.19.

4.19 If further friction cannot be obtained by carrying out the above procedure, the friction collars are worn and a new Trendelenburg screw assembly should be fitted. Refer to section 4.29 under REMOVAL AND INSTALLATION OF COMPONENTS.

4.20 For tables having the latest design of Trendelenburg screw assembly (see note preceding 4.18) check the adjustment of the friction collar on the Trendelenburg screw. If the table does not easily stay in Trendelenburg or reverse Trendelenburg position, but tends to slip down under patient's weight, this indicates that the friction collar needs adjusting. Proceed as follows:

i Remove the leg flap.

ii Unscrew and remove the end cap tubes from the Trendelenburg screw assembly.

iii Using torque screwdriver (Part No. 759581 set to 20-25 lb.in. and fitted with adaptor T2095 and 20mm socket), check the setting by locating socket over the hexagon on the end of the leadscrew and turning the torque screwdriver.

iv If the leadscrew rotates before the torque screwdriver reaches 20-25 lb.in. the friction collar requires adjusting as (v) below. If the leadscrew does not rotate the friction collar setting is correct and requires no further adjustment and the table can be reassembled.

v Adjust the friction collar by slackening the

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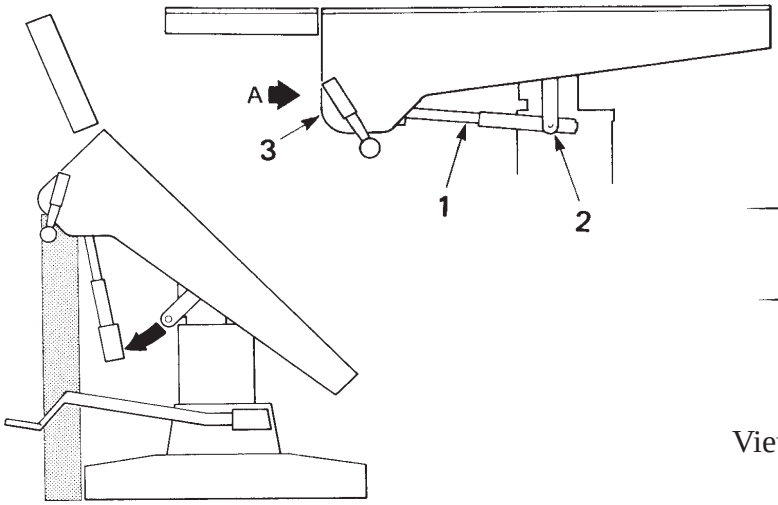
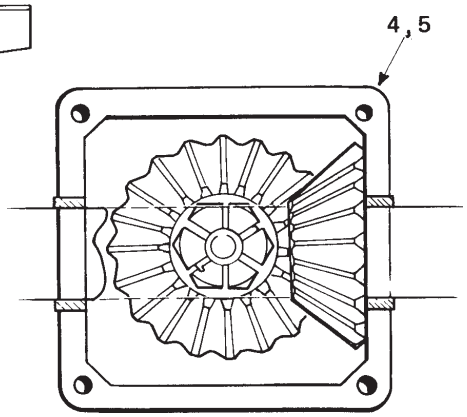
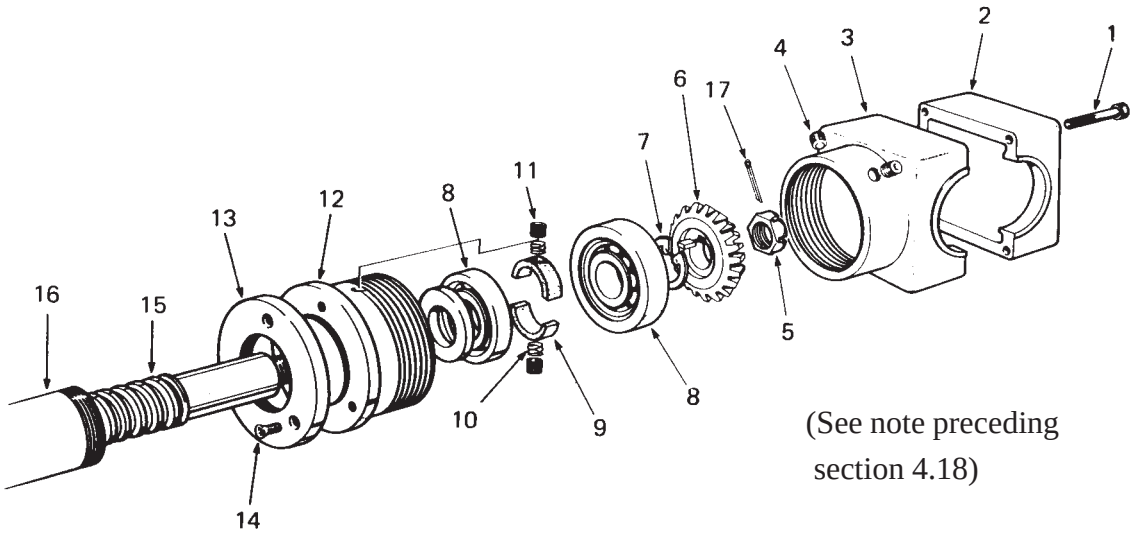




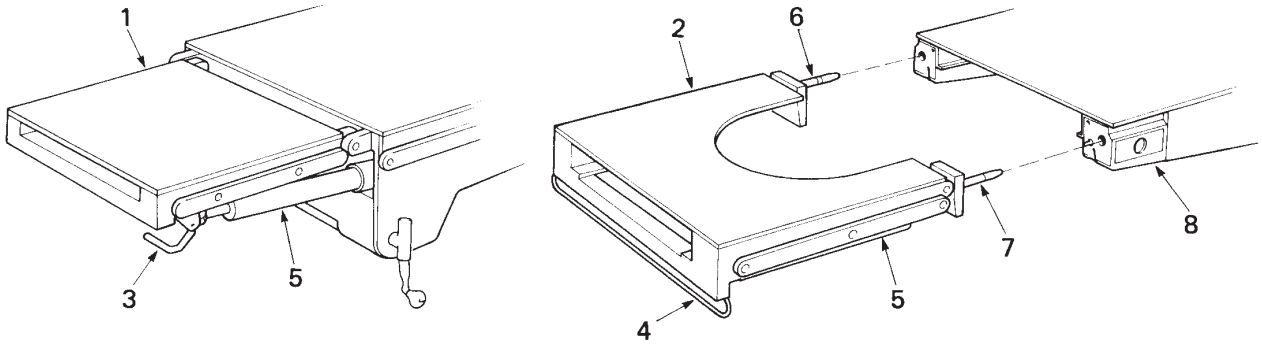
View on Trendelenburg screw bevel gear - half cover removed.

Fig. 6 Releasing Trendelenburg screw assembly



(See note preceding section 4.18)

Fig. 7 Trendelenburg screw assembly



1. Head section
2. Leg section
3. Release handle
4. Release bar
5. Gas spring
6. Locking pin
7. Guide pin
8. Push-button catch

Fig. 8 Head (J1, J2, and J3) and leg sections

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single grub screw that locks the torque adjuster nut and removing the three screws securing the cap ring located at the rear of the gearbox housing thus exposing the torque adjusting nut. Locate spanner (tool number T2097) onto the torque adjuster nut and tighten or slacken to gain the correct setting (i.e. the torque setting is above that given in (iii) above but operation of the Trendelenburg handle is not too difficult).

vi Replace the cap ring and secure using the three screws, lock the torque adjuster nut by tightening the single grub screw and reassemble the table.

Head section J1, J2 & J3 (Fig. 8), J5 (Fig.16)

4.21 Proceed as follows:

i Test the action of the release handle and gas spring. If the gas spring support is unsatisfactory (head section fails to maintain its position) the complete gas spring unit must be replaced, they cannot be serviced (see section 4.50 for J1-J3 and section 4.52 for J5, noting warnings). Also seepage of fluid indicates a failing unit.

CAUTION
Gas springs MUST NOT be additionally lubricated.

ii Examine the radiographic top panel for signs of any damage (e.g. cracks or chips).

Leg section and catches (Fig. 8 and 14)

4.22 Proceed as follows:

i Remove the leg section, then clean out any collected debris from the recesses of the locking and guide pin push-button catches in the trunk section of the table and lubricate the catch mechanism. Test the action of both catches (see section 4.43).

ii Check spring loaded nylon plungers (2) Fig. 14 for smooth action (see section 4.44).

iii Check tightness of pivot screws.

iv Clean and lubricate locking pin (6) Fig. 8 and guide pin (7) Fig. 8 with a light machine oil.

v Check to make sure that locking pin and guide pin securing screws (at the rear of each pin) are securely tightened.

vi Refit leg section and test the action of the release bar and gas springs. If the support of either or both gas springs is unsatisfactory (leg section will not maintain its position or tends to sink to one side) the complete gas spring unit(s) must be replaced; these items can not be serviced (see section 4.51). Also seepage of fluid indicates a failing unit.

CAUTION
Gas springs MUST NOT be additionally lubricated.

vii Finally, examine the detachable radiographic top panel for signs of any damage (e.g. cracks or chips) and check that the securing spring collars of the radiographic top are not damaged.

FAULT DIAGNOSIS AND REMEDIES

Excessive lateral movement of table top (Fig.1)

4.23 Lateral movement of the table top is controlled by the tapered ram key (3). Excessive movement is due to wear of the ram key increasing the clearance in the keyway. This can be corrected by slightly loosening the ram key clamping bolts (4), gently tapping the key into the keyway until excess movement has been removed and retightening the clamping bolts. Check that the ram key has not been over-tightened by fully raising and lowering the table top. If the table top will not raise or lower correctly, the ram key has been over-tightened and must be slackened until normal raising and lowering of the table top can be achieved.

Inability to raise table top (Fig. 9 and 10)

4.24 If normal operation of the height control pedal fails to raise the table with the pedal travelling through its full stroke, the fault is probably due to the presence of dirt in the ball valve, (1) Fig. 10 of the hydraulic cylinder. It is often possible to clear this obstruction by vigorously operating the height control pedal. If

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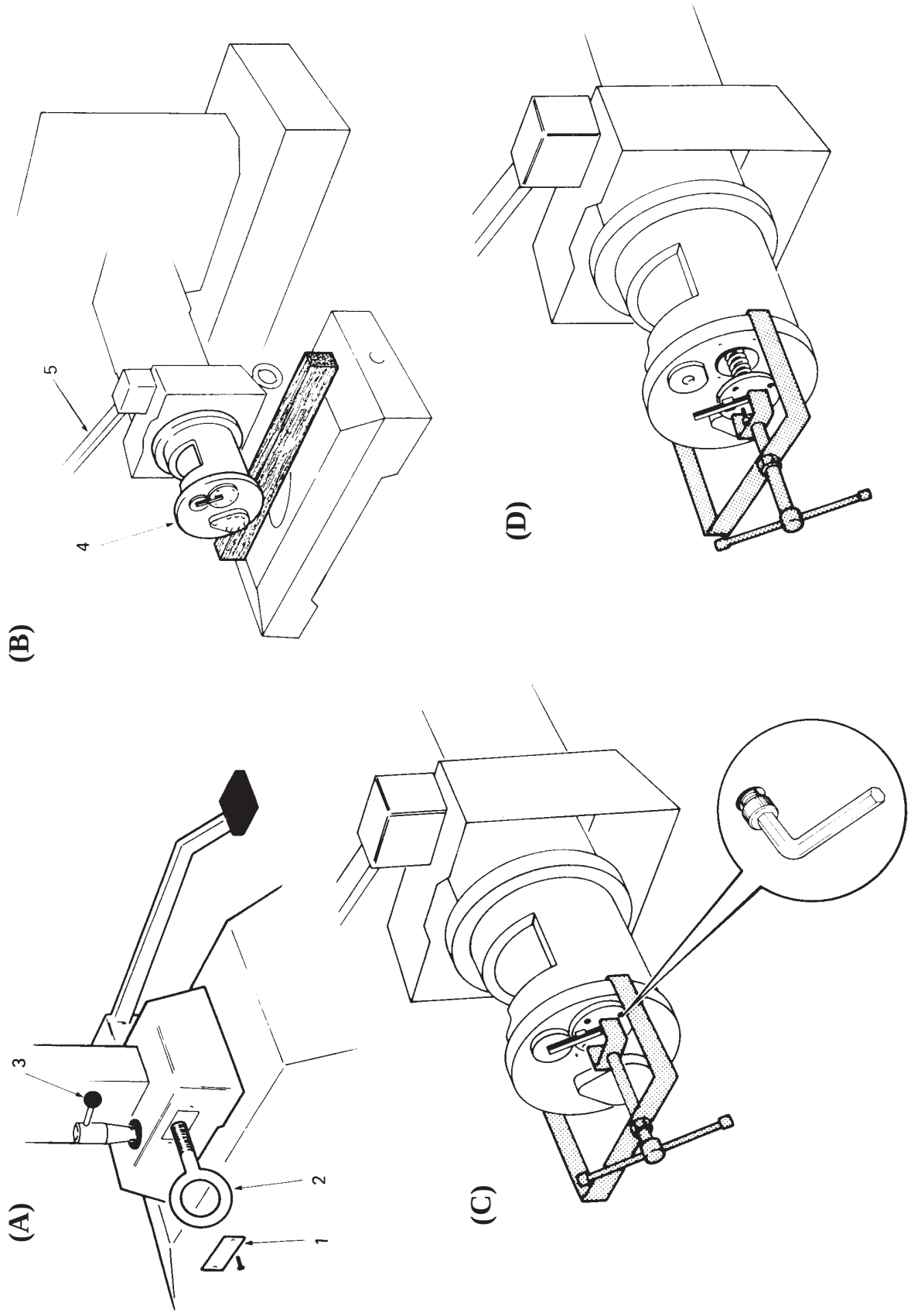

Fig. 9 Removing hydraulic cylinder from table base

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this fails, remove hydraulic cylinder from base (see section 4.31); the ball valve should then be disassembled and cleaned (see section 4.33). If the pedal is suddenly inoperable either when raising or lowering the table, refer to section 4.26.

Table top not maintaining height (Fig. 9 & 10)

4.25 If table top fails to maintain height, raise it to its maximum height, fully depress the height control pedal and, by pressing on the table top, force the table top downwards as quickly as possible. Repeat this operation several times. If this does not rectify the fault remove hydraulic cylinder from base (see section 4.31) then examine the hydraulic mechanism for:

a) Condition of ball valve jointing washer (2) Fig. 10. If faulty, replace it (see section 4.33).

b) Secureness of ram cover plate (3) Fig. 10. If it is loose, re-tighten it.

c) Efficiency of ball valve (1) Fig. 10. If blocked or jammed, disassemble and clean it, (see section 4.31). If the seating of the larger (spring-loaded) ball has been damaged, replace the complete valve.

d) Condition of ram cup washer (4) Fig. 10. If worn or chipped, replace it (see section 4.32).

Operation table will not lower (Fig. 9 and 11)

4.26 First examine the steel ram for rust (see note below); a type of black rust not easily noticed can form on the circumference of the ram. This can be identified by rubbing a piece of emery paper on any discoloured portion of the ram surface. If rust is detected, it must be removed completely, as follows:

NOTE: Tables with serial numbers **above** those given here have a black coating which prevents this rust occurring, J1 - 2172, J3 - 1295, J3 - 0590, J5 - 3059.

i Protect the top of the cylinder by tying a piece of rag around the ram.

ii Clean the ram surface thoroughly by rubbing hard with emery paper.

iii Carefully clean off all particles of grit and completely cover the exposed ram surface with oil.

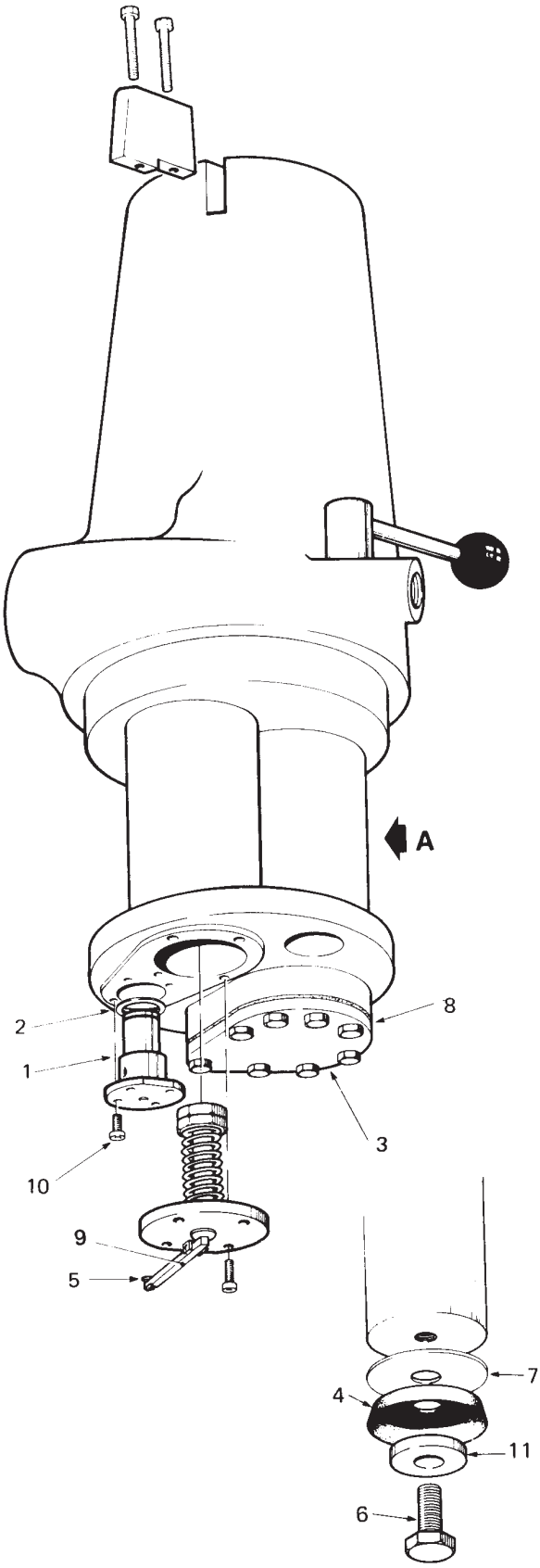

Fig. 10 Hydraulic cylinder assembly

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iv Test the raising and lowering movement of the table top.

4.27 If on testing the table pump mechanism for normal function it is found to be still inoperable this may be due to the fact that efforts made to lower the table while seized have strained the pump lever driving pin or the ram release mechanism. If the table top descends at all in response to pump lever operation, the descent will be sluggish. To remedy this the following procedure should be carried out:

i Refer to section 4.31 and remove hydraulic cylinder from table base.

ii Examination of the ram release movement must now be carried out. Refer to Fig. 11. When the pump lever is depressed fully, this operates the ram release lever (1). The ram release lever pivots and the release screw (2) enters the ball valve and should lift the lower ball (3) at the end of lever travel. Before testing this movement, the pressure in the ball valve should be overcome by forcing the release lever into the ball valve after covering the cylinder with a cloth to avoid leakage of oil under pressure.

iii Now depress the pump lever fully and hold in this position. Test the ram release lever by trying the movement using thumb pressure. If the movement is other than very slight, adjustment is required.

4.28 To adjust ram release mechanism, proceed as follows:

i Position the compression tool clamp (included in the tool kit available for the MR series tables) across the base of the cylinder (see Fig. 9(c)) and lightly tighten it onto the ram release. Use an Allen key to remove the four screws holding the ram release in position.

ii Loosen the clamp until oil starts to run from the hole. Allow the oil to drain.

iii Continue to unscrew the clamp until completely loose then remove clamp and ram release (see Fig. 9(d)).

iv Refer again to Fig. 11. Adjustment consists of unscrewing, in a clockwise direction, the two large lock nuts (4) on the end of the release plunger (5) to allow more movement of the ram release lever. This is in order to cause the ball of the ball valve to be lifted further and so release the table ram. (For a more detailed explanation of the hydraulic system, refer to section 4.53 and 4.54).

Note: This adjustment can only be made on a trial and error basis. Each time an adjustment

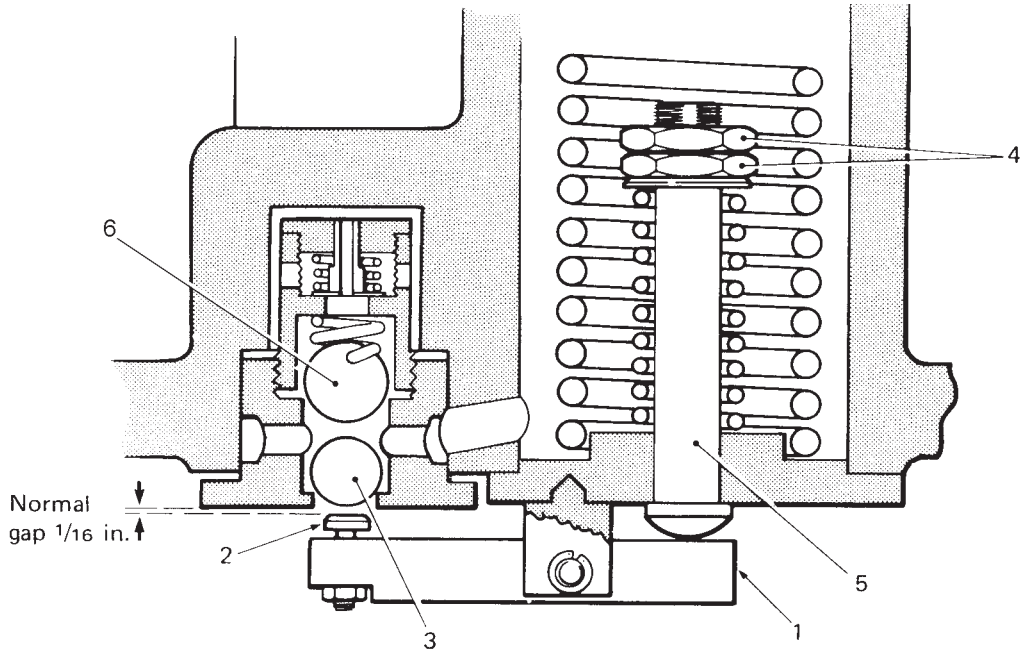

Fig. 11 Ram release mechanism - adjustment

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is made the ram release must be refitted into the cylinder and the pump lever tried and held to ascertain whether the release screw on the lever projects too far into the ball valve, or still not enough. Care must be taken to adjust this correctly as strain will occur either side of the normal. As a guide, the normal setting is 1/16in between release screw and ball valve housing (approximately the thickness of an engineer's steel ruler).

v When the correct adjustment has been made, lift the cylinder and table top bodily and guide the cylinder back into the well of the base. DO NOT ALLOW THE CYLINDER TO DROP INTO THE BASE. When the table is in an upright position and before lowering it into the base, refit the locking lever. This will prevent the escape of oil from the cylinder.

The table top should now raise and lower normally.

Note: If it is found that the driving pin of the pump pedal has been bent - too badly for any adjustment - a new pump lever must be fitted.

REMOVAL AND INSTALLATION OF COMPONENTS

Replacement of Trendelenburg screw (Fig. 6 and 7)

4.29 To replace the Trendelenburg screw, remove the old Trendelenburg screw assembly from the operation table as detailed in 4.18. Fit a new Trendelenburg screw assembly (latest style see note in 4.18) and adjust it to the correct torque setting as detailed in section 4.20. Reassemble the table.

Note: The bevel gear housing has one thick and one thin side wall. The *thin* side wall should be fitted round the neck of the gear shaft bevel gear. Ensure that the upper bevel gear housing is orientated to match before attempting to refit the cap head screws securing the two halves of the housing together.

Replacing lateral tilt drive belt (Fig. 3 and 12) - J2 and J3 tables only

4.30 If, on examination of the lateral tilt gear drive belt, it appears that the belt needs replacing, proceed as follows:

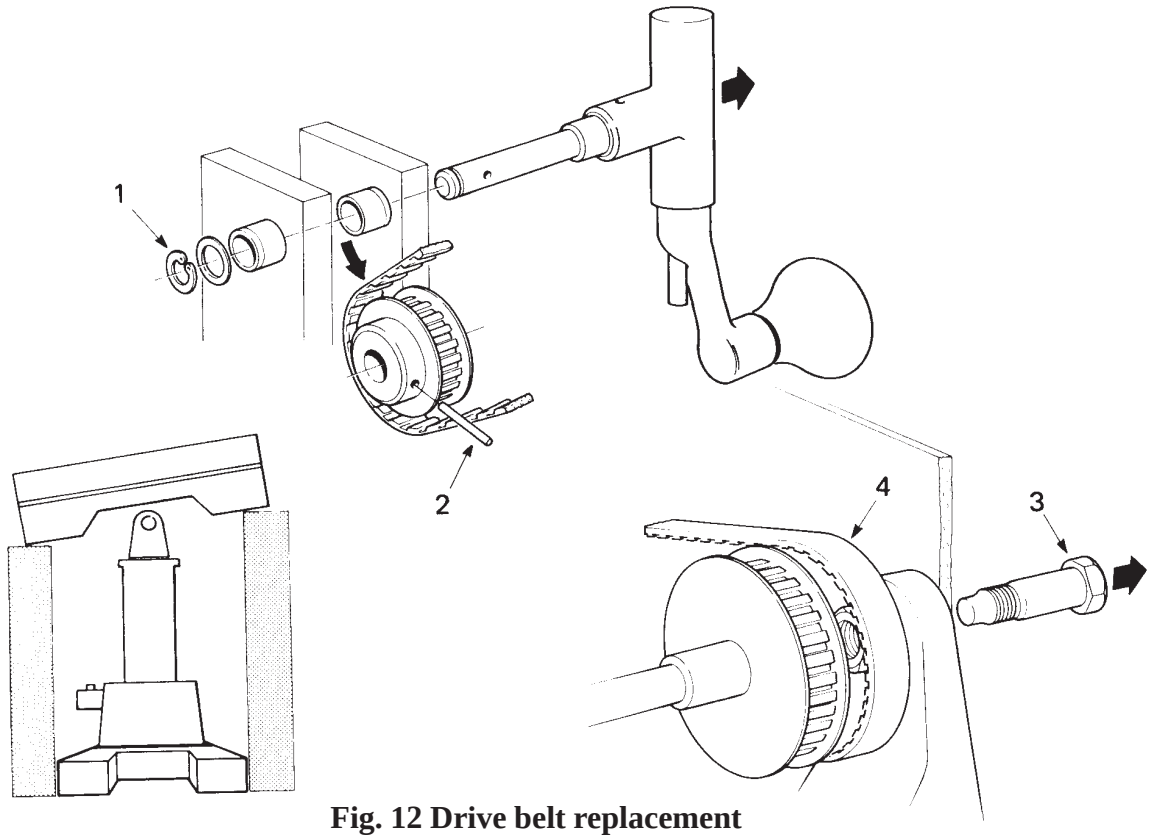

Fig. 12 Drive belt replacement

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i Remove gearbox cover (1) Fig. 3 and drive belt guard (7) Fig. 3 and place table top in reverse Trendelenburg position.

ii Refer to Fig. 12. Remove circlip (1) from lateral tilt control handle shaft.

iii Remove pin (2) from pulley at control handle end of drive belt and extract handle and shaft from pulley centre to free the pulley and drive belt.

iv Bolster the sides of the table, then unscrew the second drive belt pulley bearing screw (3) from the outside of the table frame to create a gap wide enough to allow the drive belt (4) to be removed.

v Exchange the drive belt for a new one, then reverse procedures (1), (2) and (3) to reassemble the lateral tilt drive mechanism.

Removing hydraulic cylinder from table base (Fig. 9)

4.31 Due to the weight of the assembly, three persons will be required for this operation. Proceed as follows:

i Remove leg section and, if possible, lower the table top to its lowest position.

ii Remove plate (1) from cylinder base cover and secure into the exposed tapped hole the lifting eyebolt (2) which is provided in the table tool kit (see Illustrated Parts List, T-IPL8).

iii Turn cylinder locking lever (3) fully counter-clockwise and remove it.

iv With one person holding the lifting eyebolt, a second holding the pump pedal and a third steadying the table top, lift the cylinder from the table base.

v When the bottom end of the ram cylinder is lifted clear of the table base, swing the table top and cylinder so that the cylinder (4) is almost horizontal then lay the table top onto a low support, pump pedal (5) uppermost, with the bottom of the cylinder resting on a strong wooden batten placed across the well of the base; this will allow surplus oil to drain into the base.

Replacing ram cup washer (Fig. 10)

4.32 Remove hydraulic cylinder from table base (see section 4.31), then proceed as follows:

i Remove cover plate (3) taking care not to damage the sealing gasket; the ram cup washer will then be exposed.

ii Remove washer retaining screw (6), washer (11), ram cup washer (4) and backing disc (7).

iii Refit the backing disc (7) together with a new cup washer (4) smearing the latter with a little of the oil used for the table hydraulics.

iv Refit the retaining screw and its washer but use only *moderate* tension to tighten the retaining screw; too much and the ram cup washer will tend to buckle and allow peripheral oil seepage - too little and oil will leak past the backing disc.

v Refit cover plate (3) and sealing gasket (8), then manhandle table into base ensuring, before doing so, that the cylinder locking lever (3) Fig. 9 is refitted.

Removing and cleaning ball valve (Fig. 10)

4.33. Remove hydraulic cylinder from table base (see section 4.31) then proceed as follows:

i Remove ram release lever pivot (9) - Sellok pin or screwed pin and lock nut - then remove ram release lever.

ii Unscrew the four ball valve retaining screws (10) and insert two of these screws into tapped holes in valve flange.

iii Continue to turn retaining screws until valve assembly is forced from its seating.

iv Disassemble ball valve assembly and thoroughly clean all components in a suitable solvent.

v Reassemble and refit ball valve, preferably using a new jointing washer (2).

Changing hydraulic oil (Fig. 9)

4.34 Under normal circumstances it will not be necessary to change the oil in the table base for ten years. After that time change the oil, using 2.8

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litres (5.0 Imperial pints) of the Eschmann (Matburn) oil supplied (equivalent to SAE 30 motor oil).

4.35 To change the oil, proceed as follows:

i Lift table top and ram cylinder away from table base, as described in section 4.30 then, after draining off excess oil from cylinder back into table base, remove table top and cylinder assembly and lay it on its side. (Do not stand the assembly on the bottom of the cylinder as this will damage the relief valve mechanism).

ii Invert table base to empty out all the oil and clean out the oil reservoir thoroughly.

iii Reassemble the table into its base.

iv Remove oil filler cap and pour 2.8 litres (5 Imp. pints) of the hydraulic oil supplied into the sump via the oil filler (see illustration page 6). To do this effectively, the oil should be added little by little and the table raised and lowered via the pump pedal after each addition until full table movement can be achieved. This method ensures that excess oil is not introduced.

Replacing an antistatic wheel in table base (Fig. 2)

4.36 Refer to section 4.3 and tilt table with pump pedal uppermost and wheel to be removed uppermost, then proceed as follows:

i Withdraw grub screw (7a) just sufficiently to be able to tap out the domed wheel spindle (8) from the inside, while still retaining the bush in position.

ii Slacken grub screw (7b) then fit replacement antistatic wheel with original domed spindle. Adjust position of bush under grub screw (7b) to accommodate width of new wheel, then retighten grub screw (7a) into the dimple of the spindle.

iii Finally, tap the inside bush under grub screw (7b) to make a close fit against the wheel and then tighten grub screw (7b).

Replacing castor (Fig. 2)

4.37 The castor assembly is complete with yoke, twin wheel (Tufnol or antistatic rubber), spindle and spindle securing nut. To replace a damaged castor, refer to section 4.3 and tilt the table with the pump pedal uppermost and the castor to be removed uppermost, then remove the four set screws (5) and release the castor mounting plate from the table base.

Note: Ensure when replacing castor that the wheels of the new castor assembly are identical to the original ones (i.e. Tufnol or antistatic rubber).

Replacing worn brake pad (Fig. 2)

4.38 Tilt the table to expose the base underside (see section 4.3) then proceed as follows:

i Note the direction of tread pattern of the worn pad (11), before removing pad.

ii Remove the two hex screws (10) securing brake pad to frame and install new pad, with the tread pattern facing in the same direction as that noted in (i) above.

Replacing brake quadrant (Fig. 2)

4.39 If the base control pedal movement is uneven and jerky the quadrant teeth may be damaged. This can be ascertained by feeling with the fingers under the table base. Tilt the table to expose the base underside (see section 4.3) then proceed as follows:

i Remove socket head stop screw (12) from beneath cut-out end of quadrant (14).

ii Turn the quadrant clear of the roller (16) remove hex. nuts (17) and withdraw the quadrant. If quadrant teeth are broken, fit new quadrant. For renewal of quadrant pinion, carry out the procedure detailed in the following paragraph.

Replacing quadrant pinion (Fig. 2)

4.40 Symptoms of jerky movement on base control pedal could also be due to broken quadrant pinion teeth. Verify as section 4.39 for broken quadrant. Tilt the table to expose the base underside (see section 4.3) then proceed as follows:

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i Remove quadrant (see section 4.39).

ii Turn base control pedal (9) until small end of taper pin, securing pinion (13) can be seen.

iii Using a hammer and punch, carefully knock out taper pin.

iv Slacken the grub screws in the two collars (18) on the brake shaft.

v Pull base control pedal and shaft out of table base, allowing quadrant pinion to fall clear.

vi Position new pinion on shaft, lining up the taper pin drillings in the pinion with those on the shaft. Maintaining the tapers in line, ream the pinion drilling relevant to the shaft and loosely fit taper pin. Remove taper pin and pinion from shaft.

vii Locate base control pedal shaft in table base with collars and spring, and secure collars in correct position. Install pinion on end of shaft and fit taper pin.

viii With base control pedal in 'castor' position (see diagram on base instruction plate) install quadrant between roller (16) and eccentric pin (19). Ensure that quadrant and pinion mesh correctly and that the base control pedal is parallel with the base instruction plate in the 'wheel' position, before fitting stop screw (12) to quadrant. Check that brake pads are just clear of the floor in the 'wheel' position.

ix The eccentric pin (19) should be adjusted to take up any excessive play between quadrant and roller.

Replacing broken quadrant pillar (Fig. 2)

4.41 Proceed as described in section 4.38 to remove quadrant, then remove and replace broken quadrant pillar. Reassemble components.

Replacing a control handle (Fig. 13)

4.42 The following procedure must be carried out:

i Punch out taper pin (1) and remove damaged handle (2).

ii Take measurement for drilling new handle, then drill (***one*** side only) a suitable diameter hole to allow use of a tapered reamer.

iii Slide new handle onto shaft (3) and align hole through shaft with newly drilled hole in handle.

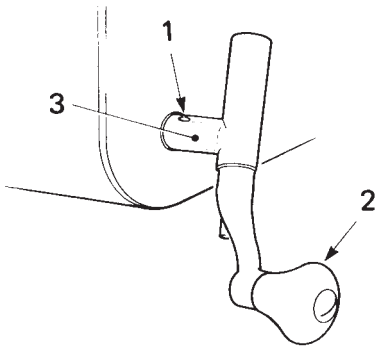

Fig. 13 Replacing a control handle

iv Complete drilling through handle, using a wooden block for the drill to break into - hence protecting the plating on the handle.

v Use a tapered reamer to shape out the holes for the taper pin. Fit new taper pin (1) ensuring that it is inserted through the aligned holes the correct way round.

Replace push-button catches for leg section (Fig. 14)

4.43 Should it be necessary to gain access to the push-button catches for cleaning, lubrication or replacement, first remove the leg section and apply a screwdriver to the slotted end of the threaded spindle of the catch (1). The catch spindles are readily visible at the end of the table trunk section underneath the radiographic top.

4.44 The *right* hand push-button 'A' catch operates in conjunction with a spring loaded plunger (2) which, in turn, operates to retain the push-button in the 'release' position if the button is pressed with the head or leg section in position.

4.45 The *left* hand push-button 'B' catch has no retaining plunger and must be pressed in continuously while the head/leg section (or table accessory, where appropriate) is being withdrawn.

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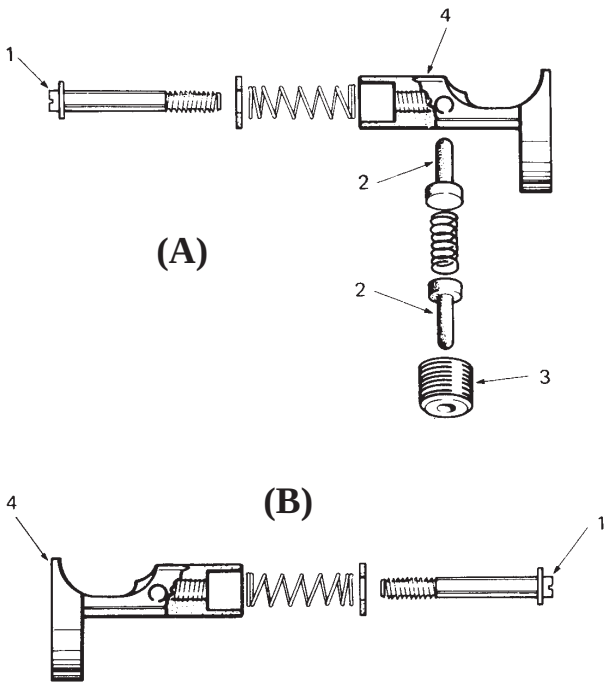

Fig. 14 Catch mechanism for leg section

4.46 Ensure that the spring loaded plunger (2) referred to in section 4.44 moves freely in its socket. If the plunger has become damaged or distorted such as to impair free movement, it should be replaced. To remove plunger, unscrew threaded bush (3).

4.47 To remove a faulty latch, unscrew threaded spindle (1) completely and lift away push button/ latch assembly (4). If the latch has scored the attachment pins of head/leg section the complete push-button/latch should be replaced. Repair any scoring on attachment pins with a fine file and/or crocus cloth before placing in service again.

Replacing release handle - head section, J1, J2 and J3 (Fig. 15)

4.48 To detach head section release handle for replacement, extract the release handle pivot pin circlips (1) and tap out the pivot pin (2). Remove release handle (12).

Replacing release bar - leg section (Fig. 15)

4.49 To detach leg section release bar for replacement, extract the release bar pivot pin circlips (3), on both sides of the leg section, and tap out the pivot pins (4). Remove release bar (13).

Replacing gas spring unit - head section J1, J2 and J3 (Fig. 15)

WARNING
Gas springs are filled with high pressure gas. Do not attempt to open them.

4.50 To detach head section gas spring unit for replacement, unscrew hex. nut (5) from release handle trunnion block at piston end then remove pivot pin circlips (6) from bracket supporting cylinder end of unit and tap out the pivot pin (7). Remove gas spring unit (14).

Replacing gas spring unit - leg section (Fig. 17)

4.51 See warning in section 4.48. To detach a leg section gas spring unit for replacement, unscrew hex. nut (8) from release bar trunnion block at piston end then slacken set screw (9), tap out pivot pin (10) and free stop strap (11) from bracket supporting cylinder end of unit. Remove gas spring unit (15).

Replacing gas spring unit - head section J5 (Fig. 16)

4.52 See warning in section 4.48. To detach head section gas spring unit for replacement, unscrew hex. nut (1) from gas spring pivot (2) at piston end then remove pivot pin circlips (3) from hinge plate (4) supporting cylinder end of unit and tap out the pivot pin (5). Remove gas spring unit (6).

4. MAINTENANCE

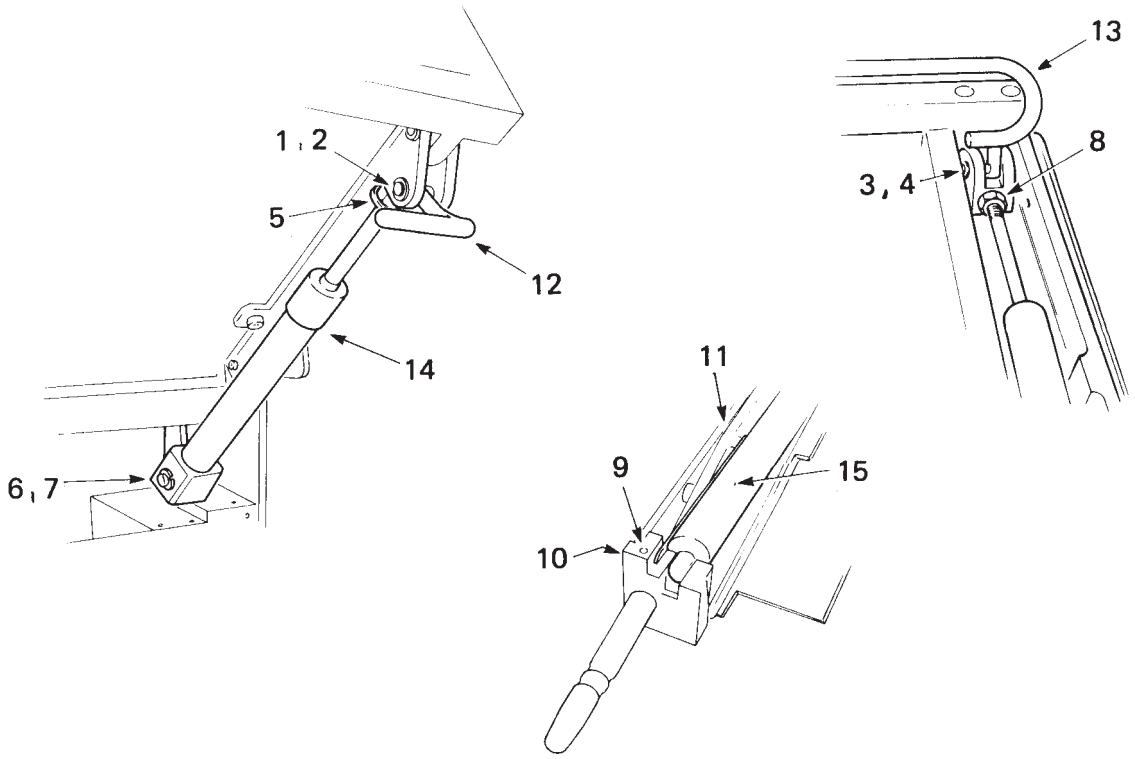

Fig. 15 Removing release handle/bar and gas spring unit

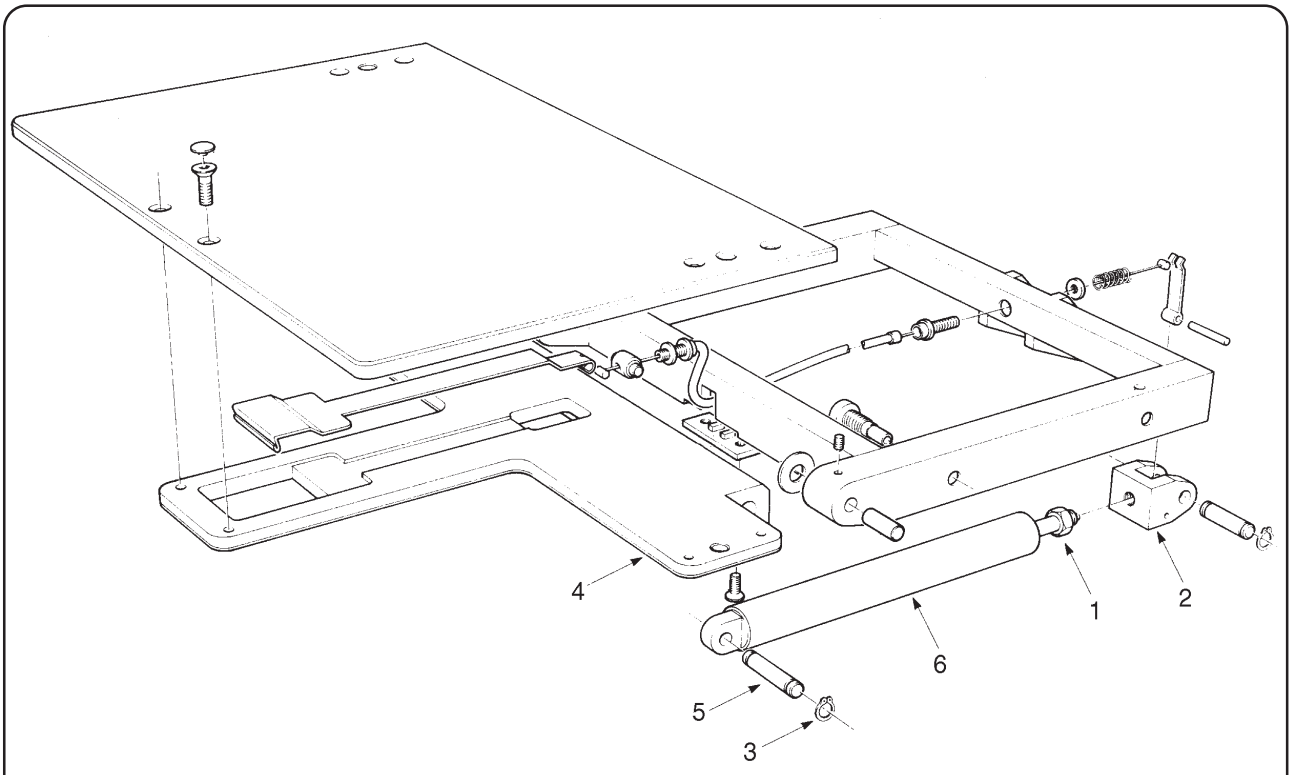

Fig. 16 Head section J5, replacing gas spring unit

4. MAINTENANCE

HYDRAULIC SYSTEM OPERATION NOTES (Fig. 17)

4.53 The following description is to give the user an appreciation of what happens within the hydraulic system during operation of the pump pedal to raise and lower the table top. It should be read in conjunction with section 4.26 and 4.27 when making adjustments to the setting of the ram release mechanism.

4.54 The hydraulic flow sequence, illustrated in Fig. 17 can be followed by referring to diagrams A, B and C.

A. Pump pedal up-stroke. Oil is drawn from sump into piston chamber (3) via the small ball valve (7) which is lifted from its seat.

B. Pump pedal down-stroke (using normal foot pressure). Oil under pressure from piston chamber (3) closes small ball-valve (7) but opens large ball-valve (8) and pilot valve (9), allowing pressurised oil to reach the ram chamber (6).

C. Pump pedal pushed fully down. Piston (2) contacts release plunger (10) to operate ram release lever (11) which opens both small and large ball-valves (7) and (8). Oil from ram chamber (6) then flows at a controlled rate back to the sump via *inner bore* of pilot valve while the pilot valve is seated.

1. Pump pedal
2. Piston
3. Piston chamber
4. Ram
5. Ram cup washer
6. Ram chamber
7. Ball valve (small)
8. Ball valve (large)
9. Pilot valve
10. Release plunger
11. Ram Release lever

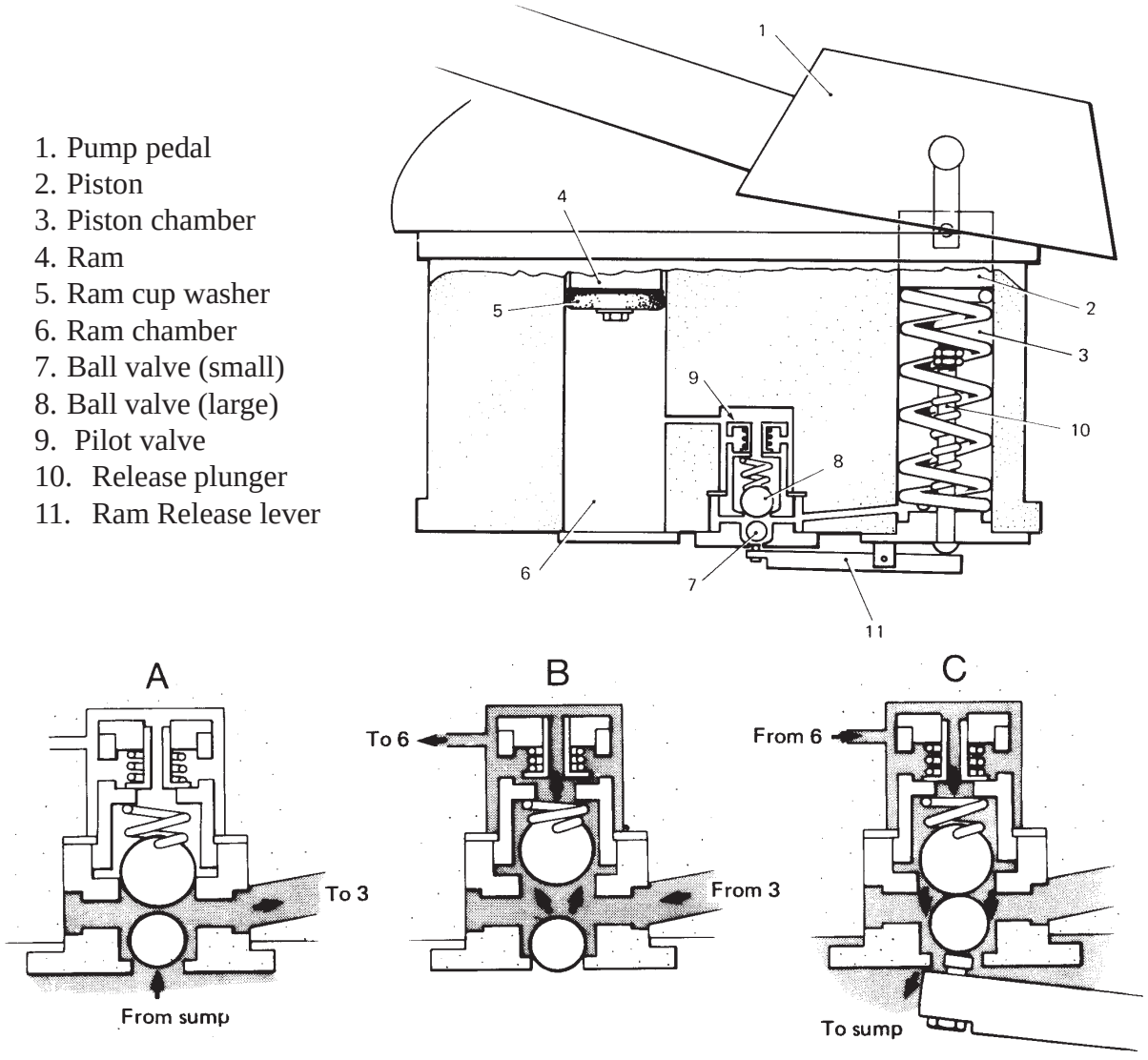

Fig. 17 Hydraulic system operation

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